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DEPARTMENT OF INTERNAL AFFAIRS
James F. Woodward, Secretary

BUREAU OF TOPOGRAPHIC AND GEOLOGICAL SURVEY
George H. Ashley, State Geologist

COAL BEDS IN JEFFERSON COUNTY, PENNSYLVANIA

By

J. D. Sisler

Introduction.

In 1918 Jefferson County stood tenth in Pennsylvania as a bituminous coal producing county. In that year, 5,140,833 tons were produced, valued at \$14,660,229, and distributed as follows: 4,140,224 tons, valued at \$12,408,728 were loaded at the mines for shipment; 109,462 tons, valued at \$286,249 were sold to local trade, and used by employees; 171,451 tons, valued at \$335,408 were used at the mines for steam and heat; 719,696 tons, valued at \$1,629,844 were made into coke at the mines.

There are eleven coal beds in the county; some are only a few inches thick, two are of great importance, and five others are locally mineable. The Lower Freeport coal is the most important, and the Lower Kittanning second. The Brookville, Clarion, Middle and Upper Kittanning, and Upper Freeport are locally mineable.

Jefferson County, situated in the north-central part of the State, is bounded on the north by Forest and Elk counties; on the east by Clearfield County, on the south by Indiana County, and on the west by Armstrong and Clarion counties. Its greatest width from north to south is 32 miles, and from east to west 25.5 miles. Its area is about 666 square miles. The population in 1920 was 62,104.

Jefferson County has many railroads. The Bellwood Branch of the Pennsylvania Railroad enters the county from the south near Bowersville, runs northwest and branches at Elk Run Junction; one branch runs north to Anita, and the other west to Punxsutawney and Fordham. The Low Grade Division of the Pennsylvania Railroad enters the county from the west near Patton, runs northeast to Brookville, Reynoldsville, and to DuBois, Clearfield County. It runs north from that point, and

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crosses the northeastern corner of Jefferson County, serving the Brockwayville district.

The Pittsburgh and Shawmut Railroad enters the county from the west near Timblin, runs northeast through Knox and Brookville, and terminates in the northeastern corner of the county at Delwood and Lanes Mills.

The Buffalo, Rochester and Pittsburgh Railroad follows Clarion River across the northeast corner and Mahoning Creek across the southeast corner of the county. Several branches serve mining towns not on the main line.

The New York Central Railroad has a few miles of track in the county west of Brookville. It has trackage right in Jefferson County on the Low Grade Division of the Pennsylvania Railroad east of Brookville.

The Erie Railroad has a few miles of track in the northeastern part of the county. The Pittsburgh, Shawmut and Northern Railroad also uses this track.

Jefferson County is a maturely dissected region, with rolling flat topped hills which represent the remnants of an old peneplain. The valleys are greatly diversified; in places the slopes are steep and rugged, in others gentle. The streams have broad flood plains in the soft rocks, but in the hard rocks they flow through narrow ravines.

STRUCTURE.

The rocks of Jefferson County are folded in a regular succession of approximately parallel anticlines and synclines, having a general northeast-southwest trend.

Chestnut Ridge anticline is a broad fold east of Punxsutawney on which the rocks rise 1000 feet in 9 miles.

Punxsutawney syncline lies in the southeastern corner of the county, and passes through Punxsutawney. In the center of the basin, which is flat, the Upper Freeport coal has an elevation of less than 1150 feet above tide. From that elevation the coal rises gradually southeast toward the Chestnut Ridge anticline.

There appears to be a broad bench on the slope between Chestnut Ridge anticline and Punxsutawney syncline in the region north and west of Juneau. This bench is believed to be responsible for the accumulation of gas in that area.

Perrysville anticline, lying northwest of Punxsutawney syncline, enters Jefferson County near Perrysville, and trends northeast across the county. This anticline has raised the Freeport coals, so that they are within easy mining distance of the surface. This fold is best defined on Sandy Lick, from which point it subsides in both directions.

Smicksburg syncline lies between Perrysville and Roaring Run anticlines. It is a broad shallow basin, lying about two miles northwest of Perrysville, and flattening out just northwest of Rockdale.

Roaring Run anticline is one of the well defined structures of Jefferson County. It enters the county near the southwest corner, and trends northeast near Coolspring and Warsaw. The dips are rather gentle on both flanks, and its axis varies greatly in elevation.

Leechburg syncline, lying northwest of Roaring Run anticline, is a broad shallow basin, with the axis rising gradually northeast. Ringgold, Worthville, Bellview, Port Barnet, Richardsville, Warsaw and Schoffner's Corners are situated in this basin.

Brookville anticline lies west of the Leechburg basin, and enters Jefferson County just above the mouth of Little Sandy Creek, extends northeast near Brookville, and leaves the county a few miles north of Schoffner's Corners. The fold is well defined, and its axis is straight. The dips on the flanks are rather gentle.

Fairmont syncline enters the county at Troy, and extends northeast into Eldred township, where it flattens out. It is a broad shallow trough rising gently northeast.

Anthony's Bend anticline crosses the county from near Corsica to Millstone on Clarion River. It is a well developed structure at Corsica, where the rocks dip strongly southeast, but flattens out northeastward.

Centreville syncline enters the county about one mile northwest of Corsica, and crosses Clarion River east of Clarrington. It is the shallowest basin in Jefferson County.

Kellersburg anticline, crossing the northwestern tip of the county, is a broad fold, with gentle dips on both flanks.

The structure in the northeastern part of the county has not been studied in detail, but probably there are two or more minor structures in that region.

STRATIGRAPHY.

The outcropping consolidated rocks of Jefferson County are of Carboniferous and Devonian age; the Conemaugh, Allegheny, Pottsville and Mauch Chunk formations are Carboniferous, and the Pocono is Devonian. Sand, silt, and gravel deposited by streams at times of high water are present in the larger valleys.

The Conemaugh formation has been eroded in most of Jefferson County, and is nowhere intact. It is composed of sandstone, shale, thin limestones and unimportant coal beds.

The Allegheny formation has been entirely eroded in one-third of Jefferson County, and the total thickness of 300 feet is present only

in the eastern and southern parts of the county: The Allegheny formation is composed of massive sandstones, clays, shales, limestones, and several important coal beds.

The Pottsville formation, outcropping in the northern and western parts of the county, is 300 feet thick and composed of massive sandstones, shales, clay, and coal beds.

The Mauch Chunk formation, outcropping below Summerville on Mahoning Creek and on Clarion River, is composed entirely of shales.

The Pocono formation has a very limited outcrop on Mahoning Creek and Clarion River. It is composed entirely of sandstone.


COAL BEDS.

There are eleven coal beds in Jefferson County, three of which are of great importance; five others are locally mineable, and the remainder are only a few inches thick.

The following table shows the stratigraphic interval and the range in thickness of the coal beds.

Coal beds in Jefferson County.

Name of coal bed		Average interval	Range in thickness of coal beds
Allegheny	Mahoning - - - - -		0' - 2'0"
		75	
	(Upper Freeport ("E") - - - - -		1' - 6'0"
	(45	
	(Lower Freeport ("D") - - - - -		1' - 13'8"
	(50	
	(Upper Kittanning ("C'") - - - - -		0' - 3'0"
	(50	
	(Middle Kittanning ("C") - - - - -		0' - 4'10"
	(55	
	(Lower Kittanning ("B") - - - - -		0' - 3'0"
	(60	
	(Clarion ("A'") - - - - -		0' - 1'4"
	(30	
	(Brookville ("A") - - - - -		0' - 6'0"
	Mercer - - - - -		0' - 9'0"



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Mercer Coal. The Mercer coal is probably of workable thickness in some areas in the county. Its thickest outcrop is 9 feet at Fullers Station on Sandy Lick Creek. It is dirty and carries three thick shale partings. The Mercer coal has been mined at Port Barnet, where it averages 2 feet 4 inches thick, is dirty and high in sulphur.

Brookville ("A") coal. This coal, lying at the base of the Allegheny formation, is mined extensively in the Brookville district, its type locality. In the vicinity of Summerville the Brookville coal ranges from 2 feet 8 inches to 5 feet 6 inches thick, and carries a 2 to 6 inch bone parting 14 inches from the top. The lower part of the bed is high in sulphur. It averages 4 feet 4 inches thick at Cornifer, including an 8 inch bone parting 11 inches from the top. At Heidrick Junction the coal averages 4 feet thick and carries the characteristic parting. Where opened in country banks north of Brookville in Eldred township the coal averages 2 feet 8 inches thick, and is dirty and high in sulphur. In the vicinity of Fuller in Knox township, the coal averages 4 feet, and has a maximum thickness of 6 feet. The bed contains a 4 inch bone binder about 18 inches from the top, that is extremely hard to separate from the coal. The bed is locally 3 feet thick in the vicinity of Reynoldsville, including 1 inch of shale near the middle. At Falls Creek it is locally 4 feet thick, including 1 to 2 inches of shale near the middle.

The Brookville coal is deep under cover in most of the southern part of the county, but drill records indicate that it is rarely too thin to be mined, although it varies greatly in thickness.

The Brookville coal is hard, has uneven fracture, and dull lustre. It varies from 34 to 36 per cent volatile matter, 49 to 53 per cent fixed carbon, 8 to 14 per cent ash, and 2.5 to 7 per cent sulphur.

Clarion ("A'") coal. This coal, lying about 30 feet above the Brookville, averages less than 6 inches thick in Jefferson County. It has never been mined.

Lower Kittanning ("B") coal. This coal, occurring 90 feet above the Brookville, is locally important in Jefferson County. It is thin and unimportant; and only locally is of mineable thickness in Barnett, Heath, Polk, Eldred, Union and Warsaw townships.

The Lower Kittanning coal has a local maximum thickness of 3 feet in the vicinity of Brockwayville. Its average thickness is less than 2 feet. In Washington, Winslow, Henderson, Pine Creek, McCalmont, Oliver, Knox and Rose townships the bed seldom exceeds 2 feet 6 inches thick, and averages about 2 feet.

The Lower Kittanning averages 2 feet 3 inches thick in Clover, Beaver, Ringgold and Porter townships. Probably its greatest thickness and best quality is on Pine Creek, where it is extensively mined. At that locality it averages 3 feet thick, including a $\frac{1}{2}$ inch bone parting 12 inches from the top, and locally 2 or 3 inches of bone coal at the top.

The coal is locally 2 feet 10 inches thick in Perry, Young, Bell, Gaskill and Henderson townships. It is deep under cover and little is known of its quality and thickness.

The Lower Kittanning coal is soft and friable, and breaks up when mined, it has a dull lustre, and an irregular cubical cleavage. The volatile matter ranges from 33 to 37 per cent, the fixed carbon from 46 to 57 per cent, the ash from 6 to 14 per cent, and the sulphur from .9 to 3 per cent.

Middle Kittanning ("C") coal. This bed lies about 55 feet above the Lower Kittanning coal. It is thickest and best in Union township, where it averages 2 feet 6 inches, and has a maximum thickness of 3 feet 6 inches. The bed has been opened for house coal at many places in Knox, McCalmont and Union townships. It is locally 2 feet thick in other townships in the county, but openings in it are few.

The Middle Kittanning coal is locally 3 feet thick on the middle branch of Pine Creek; 2 feet thick on Big Run in Oliver township; on the headwaters of Little Sandy Creek it is 4 feet 10 inches thick, with a 10 inch shale parting in the middle of the bed. In Clover township near Troy it is 18 inches thick; at the head of Beaver Run in Rose township 4 feet thick, but is mostly bony coal. It is uniformly 3 feet thick in the vicinity of Rose. In Union township, south of Corsica, it is locally 3 feet thick, and north of Corsica 2 feet 10 inches thick. The coal is clean and good. East of Corsica it is 2 feet 6 inches thick but rather impure. The Middle Kittanning coal is locally 3 and 4 feet thick in Warsaw and Washington townships. The coal is clean, without partings, and has excellent quality.

The Middle Kittanning coal ranges from 29 to 34 per cent volatile matter, 48 to 55 per cent fixed carbon, 7 to 12 per cent ash, and 1 to 3 per cent sulphur.

Upper Kittanning ("C'") coal. This bed, lying about 105 feet above the Lower Kittanning, is generally thin and unimportant in the county, although locally it is thick and mined.

In Ringgold township, on Pine Run, the coal has a maximum thickness of 2 feet 9 inches. In Union township, near Corsica, it ranges from 2 feet 6 inches to 3 feet thick, and is opened for local fuel.

The Upper Kittanning is rarely over 2 feet thick in the northern townships and is poor in quality.

It is deep under cover in large areas in the eastern and southern townships, and little is known of its quality and thickness. It is mined extensively along the Pennsylvania Railroad in Winslow and Washington townships and is persistently 2 feet thick, having a local maximum thickness of 3 feet. It carries no distinct partings or binders.

The Upper Kittanning coal commonly has 30 to 35 per cent volatile matter, 52 to 56 per cent fixed carbon, 7 to 11 per cent ash, and 1 to 4 per cent sulphur.

Lower Freeport ("D") coal. The Lower Freeport coal, lying 155 feet above the Lower Kittanning, and 45 feet below the Upper Freeport, is the most important coal in the county.

The Lower Freeport coal averages less than 3 feet thick in Porter township, but is good clean coal. In Perry township it ranges from 3 feet 2 inches to 6 feet 6 inches thick, and is extensively mined. It averages 5 feet 6 inches thick on Mahoning Creek, and carries one or more bone partings, irregular in thickness and position. In the vicinity of Frostburg the coal is 4 feet 6 inches to 5 feet thick, occasionally slaty and bony, but generally clean.

The Lower Freeport has been mined extensively for many years at Anita, Adrian, Horatio, Walston, and Punxsutawney in Young township. The coal is 3 to 7 feet thick, including a bony bench at the top, averaging 4 inches, and local bands of bone and pyrite. At Walston the coal is 8 feet thick in some mines, and free from partings and binders. The coal is 4 feet to 6 feet 6 inches thick in Bell township, and carries no distinct impurities except a bony bench at the top, usually not over 4 inches thick. The Upper Freeport coal ranges from 2 feet 6 inches to 6 feet thick in Gaskill township. It is usually free from partings and binders, but in some places is split into two benches by an 8 inch shale parting about 12 inches from the bottom.

Probably the greatest thickness of the Lower Freeport coal in Jefferson County is in Henderson township, between Big Run and Desire. Here the bed is locally 13 feet 8 inches thick, including a 2 foot shale parting, 2 feet from the top of the bed. At Eleanora it ranges from 3 to 8 feet thick. It is clean where 3 feet thick, but the greater measurement includes a bone parting 1 to 2 inches thick, about 10 inches from the bottom, and 8 inches of bony coal at the top. The Lower Freeport is mined extensively at Sykesville, where it is 5 to 6 feet thick, including a bone parting 1 to 2 inches thick, 8 to 10 inches from the bottom. The top coal is also bony in places.

In McCalmont township the coal ranges from 3 feet to 6 feet 6 inches thick; averaging over 4 feet. A bony parting averaging 2 inches thick, about 2 feet from the bottom, is persistent in extensive areas. A local bony parting about $1\frac{1}{2}$ inches thick is present about 5 inches from the bottom.

In Oliver township the Lower Freeport coal averages 5 feet thick, is regular in thickness, and only locally is split by one or more thin bone partings.

In Ringgold township the Lower Freeport coal is variable in thickness, reaching a maximum of 5 feet. Its average is much less.

In Beaver, Rose, Clover, Pine Creek, Union, Eldred, Warsaw and Polk townships, the Lower Freeport coal varies greatly in thickness and quality, although there are large areas in which it averages 5 feet thick, and has fair quality. It has not been mined extensively in these townships, as it is generally rather dirty and higher in sulphur than in the eastern and southern parts of the county. In some places several thick bone partings make it useless.

The Lower Freeport coal has been eroded in Barnett and Heath townships.

In Knox township the bed averages about 4 feet 6 inches thick, and is usually clean coal. The coal is mined extensively in the Ramsaytown and Knoxdale districts, where it averages 4 feet 6 inches thick, including two thin local bone partings, at varying positions in the bed.

The Reynoldsville district in Winslow township for many years has been the center of extensive development of the Lower Freeport coal in eastern Jefferson County. The bed is extremely variable in physical character. Partings and binders are present in some mines, and are lacking in others; in some areas there are bony benches at the top or bottom. The entire bed averages over 5 feet thick, ranging from 4 feet to 8 feet 6 inches.

The Lower Freeport coal averages over 4 feet thick in Washington township, and has excellent quality. In the vicinity of Falls Creek, it is 5 feet thick, including a 1 inch parting, 12 inches above the bottom of the bed. It has been mined extensively for several years in the vicinity of Coal Glen, where it averages 3 feet 8 inches thick. In some places it has one or more thin bone partings, and is high in sulphur.

In Snyder township the Lower Freeport coal averages 3 feet 6 inches thick, locally reaching a maximum of 5 feet. It has a characteristic 1-inch bone or clay parting 8 to 12 inches above the bottom. At Brockwayville and Crenshaw, the coal is almost worked out.

The Lower Freeport coal is soft and friable, but mines out in good sized lumps. It is a "stick" and "block" coal, with alternating bands of bright lustrous and dull "mother" coal. It ranges from 28 to 35 per cent volatile matter, 51 to 60 per cent fixed carbon, 4 to 13 per cent ash, and 1 to 5 per cent sulphur.

Upper Freeport ("E") coal. This bed, lying about 45 feet above the Lower Freeport coal, is very irregular in thickness and variable in quality. In some places, however, it is a fine bed of good coal.

In Porter township the Upper Freeport coal generally is thin, and is never over 4 feet thick. On Pine Creek it is a good clean coal and is mined at several places.

The Upper Freeport varies greatly in thickness in Perry township,

but is locally a good thick coal. It is mined extensively at Frostburg, and averages 5 feet thick. Thin bone partings may be present.

At Anita, in Young township, the Upper Freeport averages 3 feet of good clean coal. It is 3 feet 6 inches thick at Punxsutawney, not including a bony bench at the top, usually 8 inches thick. The bed has a maximum thickness of 6 feet in this township; but invariably carries numerous "knife blades" of pyrite and bone, making the coal much inferior to the Lower Freeport.

The Upper Freeport coal averages over 3 feet thick in Gaskill township, and although it is not as good quality as the Lower Freeport, it is mined at many places along the Pennsylvania and the Buffalo, Rochester and Pittsburgh Railroads. Near Hillman it is 2 feet 10 inches thick, including a thin bone parting. In the Big Run district it ranges from 2 feet 8 inches to 4 feet 4 inches thick. Where thickest a bony bench, which is 2 inches thick and hard to separate from the coal, occurs about 8 inches above the bottom. It is mined at Onondago, where it averages 4 feet thick, including a 1 to 3 inch bone parting 8 inches from the bottom.

In Henderson, McCalmont, Oliver, and Ringgold townships the Upper Freeport coal ranges from 12 inches to 5 feet thick, averaging less than 3 feet. It is impure and locally carries many bands of pyrite. The largest development of this coal in these townships is along Pine Creek. Here the bed averages 4 feet 4 inches thick, including a bony bench at the top, usually about 9 inches thick, and a local parting of bone coal 2 inches thick near the bottom. It is mined just north of Anita, in McCalmont township. Here it is 2 feet 8 inches thick, not including a bony bench of variable thickness at the top.

The Upper Freeport coal has not been mined extensively in Winslow township. It averages about 3 feet thick, but is dirty and rather high in sulphur. When the Lower Freeport coal is exhausted, it will be mined more.

The Upper Freeport coal is mined extensively in Washington and Snyder townships in the Coal Glen, Brockwayville and Crenshaw districts. Here the Lower Freeport is rapidly being worked out, and the Upper Freeport is the next best coal. It averages about 2 feet 6 inches thick, and is fairly clean but high in sulphur.

The Upper Freeport coal ranges from 12 inches to 2 feet 6 inches thick in the central, western and northern townships, not already mentioned. It has been eroded in large areas, and is opened only for local fuel.

The Upper Freeport coal is soft and friable, and breaks up when mined. It has a dull lustre, and an imperfect cubical fracture. The volatile matter ranges from 28 to 35 per cent, the fixed carbon from 53 to 59 per cent, the ash from 4 to 12 per cent, and the sulphur from 1 to 4 per cent.

Mahoning Coal. A coal lying about 75 feet above the Upper Freeport, is present only in limited areas in the southern part of the county. It averages less than 12 inches thick, and has a maximum thickness of 2 feet. It has never been opened.

Other coal beds. There are two or three other beds of coal that average less than 4 inches thick.

